MINIMUM WAGE AND JOB REALLOCATION IN TÜRKİYE

by
ÖZGE KAPTAN

Submitted to the Graduate School of Social Sciences
in partial fulfilment of
the requirements for the degree of Master of Arts

Sabancı University
June 2024

MINIMUM WAGE AND JOB REALLOCATION IN TÜRKİYE

Approved by:

Prof. ABDURRAHMAN BEKİR AYDEMİR .....
(Thesis Supervisor)

Asst. Prof. YUSUF EMRE AKGÜNDÜZ .....

Prof. SEYİT MÜMİN CILASUN .....

Date of Approval: June 13, 2024

ABSTRACT

MINIMUM WAGE AND JOB REALLOCATION IN TÜRKİYE

ÖZGE KAPTAN

ECONOMICS M.A. THESIS, JUNE 2024

Thesis Supervisor: Prof. ABDURRAHMAN BEKİR AYDEMİR

Keywords: Minimum Wage, Labor Market, Task Intensity,
Job Reallocation, Low-Wage Workers

This study investigates how the 33% minimum wage hike in Türkiye in January 2016 affected the labor market prospects of minimum wage earners. We leverage employer-employee matched administrative data, enabling us to distinguish minimum wage workers from non-minimum wage workers and track them over time. Employing a difference-in-difference approach encompassing 16 quarters between 2014 and 2017, our findings reveal that minimum wage workers experience wage increases but a lower likelihood of employment following the policy change. Interestingly, they shift towards jobs with a higher intensity of nonroutine abstract tasks, while routine and nonroutine manual tasks became less prevalent. Additionally, they reallocate to larger, more productive, and higher-paying firms.

ÖZET

TÜRKİYE'DE ASGARİ ÜCRET VE İŞGÜCÜNÜN YENİDEN DAĞILIMI

ÖZGE KAPTAN

EKONOMİ YÜKSEK LİSANS TEZİ, HAZİRAN 2024

Tez Danışmanı: Prof. Dr. ABDURRAHMAN BEKİR AYDEMİR

Anahtar Kelimeler: Asgari Ücret, İşgücü Piyasası, Görev Yoğunluğu, İşgücünün Yeniden Dağılımı, Düşük Ücretli Çalışanlar

Bu çalışma, Ocak 2016'da Türkiye'de asgari ücrete yapılan %33'lük zammın asgari ücretlilerin işgücü piyasası beklentilerini nasıl etkilediğini araştırmaktadır. İşveren-çalışan eşleştirilmiş idari verilerden yararlanarak asgari ücretli çalışanları asgari ücretli olmayanlardan ayırıyor ve zaman içinde takip ediyoruz. Bulgularımız, 2014 ve 2017 yılları arasındaki 16 çeyreği kapsayan bir zaman diliminde farkların farkı yaklaşımını kullanarak, asgari ücretli işçilerin politika değişikliğinin ardından ücret artışı yaşadıklarını ancak istihdam olasılıklarının düştüğünü ortaya koymaktadır. Bu çalışanların işleri rutin olmayan soyut görevlerin daha yoğun olduğu işlere doğru kayarken, rutin ve rutin olmayan manuel görevler daha az yaygın hale gelmiştir. Ayrıca, daha büyük, daha üretken ve daha yüksek ücretli firmalara geçiş yapmışlardır.

ACKNOWLEDGEMENTS

Firstly, I would like to express my deepest appreciation to my thesis supervisors Abdurrahman Bekir Aydemir, Yusuf Emre Akgündüz, and Seyit Mümin Cılasun for their unending support and invaluable guidance throughout the thesis process.

I am also deeply grateful to Mehmet Barlo for his interest, engagement, and contribution to my academic path.

I would like to thank my friends Ömer, Betül and Mustafa for their presence by my side during countless homeworks, projects, classes, exams, and all the challenges that come with this journey.

I extend my thanks to all my friends for their unwavering support and friendship that gave me courage and helped me grow.

I would like to express my deepest gratitude to my dear mom and dad, whose unwavering presence has been a constant source of strength.

Finally, I would be remiss in not mentioning my dear roommate, for making our house a true home of comfort and serenity.

To my family, both by birth and by choice

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

1. INTRODUCTION

The economics literature on minimum wages is vast and full of debate. At its core, it examines the impact of minimum wage laws on wages and employment. Still, a common consensus is far from being reached. On the other hand, the compositional and reallocational effects these policies have on low-wage workers demand further exploration. To be precise, compositional effects explore how minimum wages alter the set of the low-wage workforce employed, whereas the reallocational effects examine how minimum wages influence the movement of workers between different firms and occupations.

As an increase in the minimum wage can affect low-wage workers differently, the dynamics behind the minimum wage require attention from researchers. For instance, some of those low-wage workers might benefit due to increasing wages, whereas others with a lower set of skills might fall into unemployment. Some might reallocate to jobs that require more abstract tasks in firms that are more productive, while others might lose their jobs due to the exits of firms that are less productive and eventually switch to informal employment. Additionally, from an employer's point of view, increases in the cost of labor could incentivize firms to substitute certain tasks with capital, causing layoffs of low-wage workers. In this context, Türkiye presents a compelling case study. Unlike any other upper-middle income country where minimum wage earners represent a smaller share of the workforce, the minimum wage workers constitute a large portion of the Turkish formal labor market with strong spillover effects higher up the wage distribution. Therefore, analyzing the effect of minimum wage changes in Türkiye regarding the compositional and reallocational shifts can offer valuable insights applicable to other developing economies with similar labor market structures.

In 2016, minimum wages increased by 33% in Türkiye due to the ruling party's political promise for the elections at the end of 2015. Inflation was around 8% that year, causing a real minimum wage increase of 25%. Eventually, unit labor cost exceeded inflation that year, affecting both firms and workers. Our paper

investigates the impact of this substantial increase in minimum wages in 2016 on minimum wage workers' labor market features such as wages, employment, task intensity composition, job switch, and reallocation of firms they are employed.

Our analysis is based on the Enterprise Information System (EIS), an integrated database compiled of various administrative records provided by ministries. The database provides linked employer-employee information on the universe of registered non-financial enterprises and the registered workers employed in those enterprises available from 2006. Our data focuses on the quarterly information between 2014 and 2017, including worker and firm characteristics. We supplement our main data with O*NET Task Scores data to match worker information on occupation with task intensity scores by following Acemoglu and Autor (2011). We perform a difference-in-difference analysis to report the effect of the policy change on minimum wage workers compared to non-minimum wage workers. We test the differences between minimum wage workers with three sub-groups of non-minimum wage workers, which are also affected by the increase in the minimum wage at different levels and report the significant differences caused by the increasing labor cost of minimum wage workers.

We document our results in three sets. First, we see that minimum wage workers experience a 12% higher wage increase than non-minimum workers. On the other hand, minimum wage workers are 4-5% more likely to lose their jobs compared to non-minimum wage workers. Second, we show a significant change in task scores of minimum wage workers compared to non-minimum wage workers in favor of nonroutine abstract task scores with a 1.1% increase. In contrast, routine and nonroutine manual task scores decrease by 0.9% and 1.3% more than non-minimum wage workers. Lastly, we detect around a 3-4% higher probability in the job switch of minimum wage workers in comparison with non-minimum wage workers, which is realized by switching to firms that are 14% larger in size, 11-18% more productive, and pay 2-4% more per worker, depending on the sub-group of non-minimum wage workers.

First, we contribute to the extensive empirical literature on the effect of the minimum wage increase on wage and employment (Card (1992a), Card (1992b), Card and Krueger (1993)). We add to this literature by using employer-employee matched administrative data that allow us to see the universe of formal labor in Türkiye. Also, we focus on the labor market in Türkiye, in which around 35% of the formal labor is composed of minimum wage workers. In addition to the high portion of minimum wage workers compared to the European zone or the US, the wages of a significant part of the non-minimum wage workers, which are higher up in the

wage distribution, may also benefit from the increases in the minimum wage due to spillovers. In their analysis of the 2004 and 2016 minimum wage hikes in Türkiye, Bakış and Polat (2013) document widespread spillover effects of the minimum wage increase that are visible for the lower half of wage distribution, closing the gap between the lower and the upper half of the distribution. The spillover is even more effective for women in the private sector, which covers the lower 75% of the wage distribution. Both Bakış and Polat (2013) and Sefil-Tansever and Yılmaz (2024) argue that the lack of a system for collective wage bargaining imposes an important role to the minimum wages in wage and price determination in the overall economy. Therefore, the changes in the minimum wage are highly relevant to the overall Turkish labor market and require further analysis. Also, it creates an important example concerning upper-middle income countries.

Secondly, we add the job polarization literature Autor, Levy, and Murnane (2003) started that foresees the demise of routine jobs in favor of nonroutine jobs. Accordingly, we exploit the increase in the labor cost of minimum wage workers often employed in routine jobs. Seeing the exact occupational code related to the worker from our data, we can elaborate on the differences in the task distribution of minimum wage workers after the increase. We also find evidence of the inability of labor markets to create nonroutine jobs to cover the unemployed workers due to sharp increases in the cost of low-wage workers (Maarek and Moiteaux (2021)).

Thirdly, we contribute to a growing number of studies that focus on the reallocation of workers after an increase in labor costs (Dustmann et al. (2022)). By utilizing our employer-employee matched administrative data, we detect the movement of the low-wage workers within the formal labor. By focusing on the firm characteristics before the minimum wage shock, we show the structural differences in the firms that minimum wage workers reallocate.

Finally, we add on the Turkish minimum wage literature. The effect of minimum wage on wages and employment has long been discussed in Türkiye (Acar and Bossavie (2019), Bossavie, Erdoğan, and Makovec (2019), Akgunduz et al. (2019)). However, the effect on the intensive margin is rarely studied. By showing the effect on task intensities and the reallocation of workers in terms of firms' characteristics, we shed light on the compositional changes in Turkish formal labor.

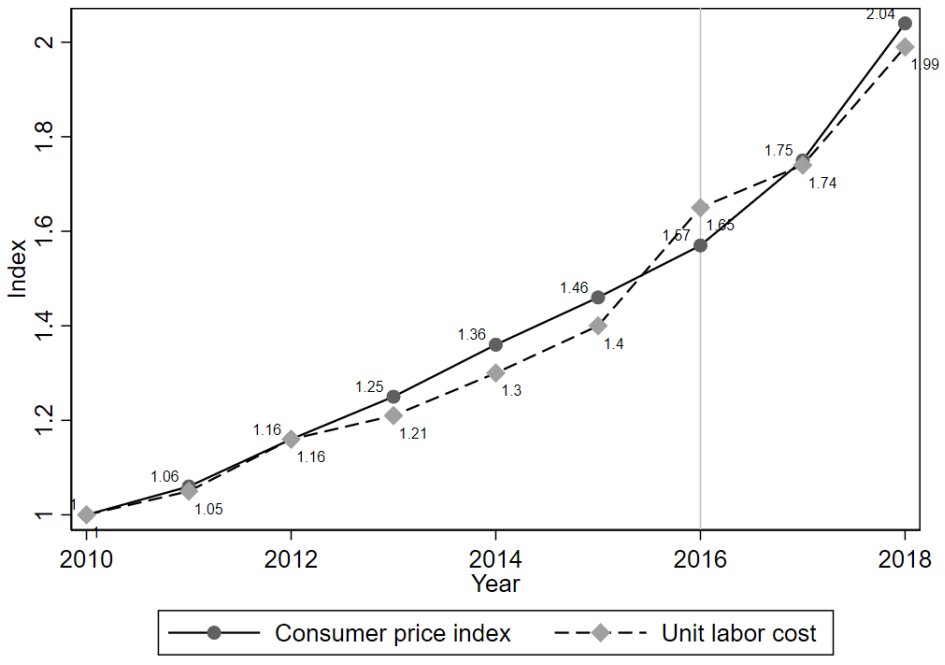
The rest of the thesis is as follows. Chapter 2 gives historical background on the evolution of the minimum wage in Türkiye and the increase in 2016. Chapter 3 details the literature on the effects of minimum wage increases on the labor market prospects of minimum wage workers. Chapter 4 gives information on the data sources that are used. Chapter 5 explains the difference-in-differences methodology

employed in the analysis, and Chapter 6 documents the results of the minimum wage increase in 2016 in Türkiye. Finally, Chapter 7 concludes the study.

2. INSTITUTIONAL BACKGROUND

The concept of a minimum wage was first introduced in Türkiye's Labor Act in 1936, but it took until 1951 for it to be implemented. From 1951 to 1967, a regional and sector-specific minimum wage, determined by local commissions, was in effect. However, this system was abandoned in 1967 in favor of the current system of a minimum wage determination commission that covers all regions, industries, and occupations (Gürcihan Yüncüler and Yüncüler (2016)). Under the current regulation, a commission with representatives from unions, employers, and the government decides the minimum wage. The Ministry of Labor sets the initial proposal, though the government ultimately defines the final amount. The meetings generally occur annually, usually in December, to determine the following year's minimum wage. Also, the minimum wage can be specified differently between the first and second half of the year or remain constant throughout the year.

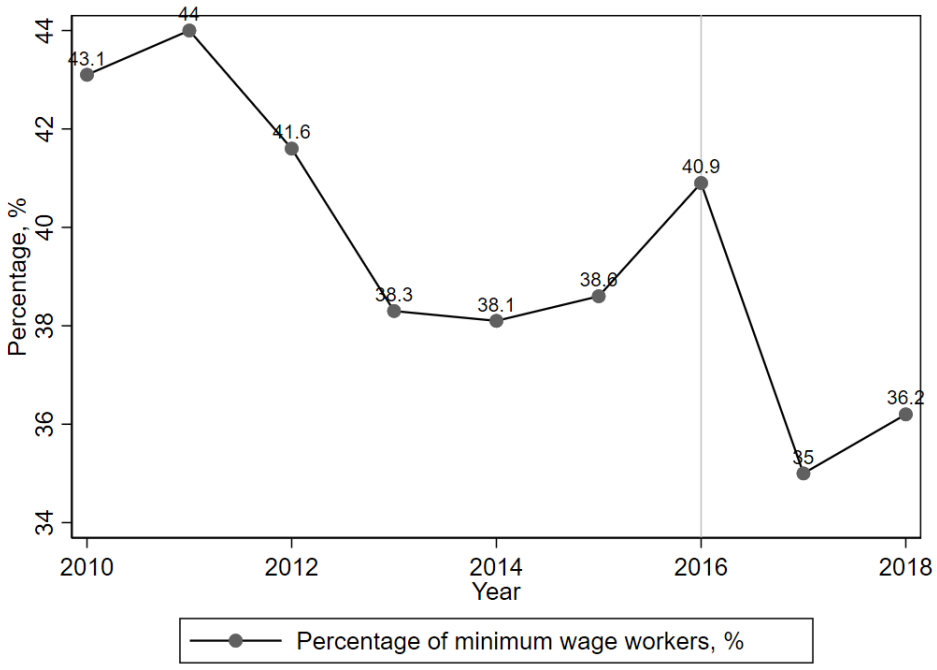
Figure 2.1 : Change in the consumer price index and unit labor cost over time, 2010=1.00



Historically, the increase in the minimum wage was determined in parallel with the increase in the nominal prices (See Figure 2.1). Unlike this trend, the minimum wage increased by 33.5% in 2016, from 1000.54 to 1300.99 TL. At the beginning of 2016, the annual inflation was 8.9%, implying the minimum wage increase was approximately 25% in real terms. Our analysis needs to note that the hike in the minimum wage was largely affected by political motives independent of the economic environment, introduced as an electoral promise for the general elections in November 2015. Besides, the increase was not discussed comprehensively until November, and the implementation was still uncertain. Eventually, the ruling Justice and Development Party (AK Party) was reelected, and the new minimum wage was implemented.

In addition to politically led reasons that created an exogenous shock, the high prevalence of the minimum wage within the Turkish economy throughout the years is important for our analysis's relevance. Figure 2.2 shows the ratio of minimum wage workers from 2010 to 2018 obtained from the Social Security Institution (SGK). The ratio peaked in 2011 with 44.0% of workers earning minimum wage and decreased steadily until 2015. In 2015, SGK reported that 5.4 million people were minimum wage workers, equivalent to 38.6% of the registered labor force. After the increase in the minimum wage in 2016, the ratio of minimum wage workers experienced a hike by reaching 40.9%, a ratio close to its level before 2012. Considering the fact that the minimum wage has been a substantial determinant within Turkish formal labor throughout the years, Türkiye offers a unique example of the effects of a minimum wage shock on job reallocation for developing economies.

Figure 2.2 : Change in the percentage of minimum wage workers over time, %



3. LITERATURE REVIEW

Our analysis focuses on the effect of minimum wage shock on wages and employment, task intensities, and reallocation of workers in terms of firm characteristics. We follow the same structure when reviewing the related literature.

We start by discussing the effect of a minimum wage hike on wages and employment. Starting in the late 1940s, the minimum wage literature mainly reported negative effects. Later, in the early 1990s, the view on the minimum wage was mixed, with different theoretical and empirical papers.

Starting with the negative views, Stigler (1946) argues that minimum wage policies cause the displacement of workers unless inefficient workers' productivity rises. Otherwise, worker reallocation can be seen in a competitive market. Similarly, Linneman (1982) finds that low-skilled workers fail to find employment due to minimum wage. Using a smaller group of low-wage workers, Neumark and Wascher (1992) and Neumark, Wascher et al. (2007) point out a significant negative impact on teenage employment and substitution away from some groups of teens. Currie and Fallick (1993) claim a 3 to 4% decrease in the probability of being employed a year after the minimum wage increase.

More recently, Harasztosi and Lindner (2019) show small negative changes due to labor substituting effects of the minimum wage, especially in industries where the cost of increasing wages can not be redirected into consumer prices in Hungary. Clemens and Wither (2019) focus on the effects following the Great Recession and conclude that at least a half-point decrease in employment exists. Bossler and Gerner (2020) argue that the increase in the minimum wage created employment loss within the German context after the minimum wage introduction in 2015.

On the other hand, many studies show a positive or null impact on employment. Lester (1960) reports a limited impact on employment aspects. Katz and Krueger (1992), Card (1992*a*), and Card (1992*b*) fail to show any detrimental effects of the minimum wage on employment in their analysis of 1990-91 increases in the federal

minimum wage within the US context. Later in their impactful paper, Card and Krueger (1993) take advantage of minimum wage policy differences between states and report an increase in relative wages and full-time employment.

Lately, Portugal and Cardoso (2006) study the effect of a sharp minimum wage increase in the mid-1980s in Portugal and suggest a reduction of separations from employers. Draca, Machin, and Van Reenen (2011) argue that the minimum wage raises without significant negative effects on employment but with a decrease in the firm profitability. Brochu and Green (2013) report a decrease in layoff rates in the first six months of a job for unskilled workers of all ages, which may be interpreted as increasing stability in the low-wage market. Dube, Lester, and Reich (2016) report a sizable effect on the earnings of teens and restaurant workers and find no evidence of labor-labor substitution. Cengiz et al. (2022) reach a wage increase without affecting employment, unemployment, labor force participation, or labor market transitions. In the German context, Bossler and Schank (2023) find negligible employment effects with a significant increase in the wages of minimum wage workers.

Secondly, we discuss the impacts of the minimum wage increase on occupational tasks. Autor, Levy, and Murnane (2003) document job polarization led by a visible decrease in the number of jobs that are heavily intensified with routine tasks in the US. These jobs are performed by low-wage workers and exposed to an increasing level of computer adaptation starting in the 1960s. Thus, the effects of an increase in the labor cost of low-wage workers due to an increase in the minimum wage is a question that many try to answer.

Lordan and Neumark (2018) and Lordan (2019) analyze the inflows and outflows of employment, but the former is in the US and the latter in the UK. They both argue that the increase in the minimum wage decreases the automatable jobs held by low-skilled workers. Also, they fail to come up with evidence that those low-skilled workers manage to find less routine, less automatable jobs within the states with a high minimum wage. On the contrary, they find significant evidence that low-skilled workers are more likely to become unemployed.

Aaronson and Phelan (2019) show that even though the impact on net employment is close to 0 in response to minimum wage increases, the number of intensively routine occupations declines in the US. This implies that low-wage routine tasks are highly affected by capital substitution. On the other hand, there is no negative effect on manually routine or nonroutine low-wage occupations.

Similar to Lordan and Neumark (2018) and Lordan (2019), Maarek and Moiteaux (2021) examine the effects on aggregate employment and claim that low-wage work-

ers in European countries with a strong minimum wage fail to reallocate to abstract or manual jobs with higher pay. Therefore, the net effect of the minimum wage increase on employment is negative.

Thirdly, we focus on the reallocation of workers due to the minimum wage increase in terms of firm characteristics. As the cost of low-wage workers increases with an increase in the minimum wage, labor-intensive production becomes less profitable. As a result, the composition of low-wage workers can be improved.

In their analysis of the Scandinavian approach to industrial reconstruction, Agell and Lommerud (1993) study the effect of central bargaining and minimum wage. They argue that wage changes in different sectors can lead to a reallocation of workers from low-productivity to high-productivity sectors. Within the same context, Edin and Topel (1997) support the previous approach that an increase in pay leads to the movement of low-wage workers to high-wage industries due to an increase in the labor costs of the low-wage workers. In his theoretical framework, Acemoglu (2001) claims that minimum wages and unemployment benefits change the composition of employment in favor of capital-intensive "good" jobs. Bossler and Schank (2023) show a reallocation of minimum wage workers from full-time to part-time employment or mini-jobs in Germany. Following the German minimum wage introduction context, Drechsel-Grau (2022) developed a search-and-matching model. Using that model, they argue that raising minimum wages creates reallocation towards full-time jobs and high-productivity firms, in line with Dustmann et al. (2022). Also, they show that the model estimates negative employment effects for the bottom 5% of the skill distribution.

Concerning the reallocation of workers, we would like to discuss a closely relevant paper in more detail. In their recent paper, Dustmann et al. (2022) also focus on the reallocational effects of the minimum wage introduction in Germany in 2015 as well as its wage and employment effects. The introduction of minimum wage law actively affects 15% of the German workforce but with a lower level of informality[1] compared to the Turkish labor market. In parallel with our methodology, they compare the relative changes in the labor market prospects of low-wage workers (that earn below the minimum wage before the introduction) with higher-wage groups after the introduction of the policy by using individual-level data. As a result of their analysis, the introduction of minimum wage resulted in a 6.0% higher hourly wage in the low-wage group in the post-policy period with a 1 percentage point increase in the probability of keeping their current job. In terms of reallocation of

[1]Hazans (2011) reports that 11.9% of the extended labor force is working informally by the last quarter of 2008 in Germany. More recently, ILO has reported the informal employment rate as 2.5% for 2022.

workers, they find that the minimum wage workers experience an increase in the overall establishment quality. In detail, they start working in establishments that pay 1.8% higher average daily wages in the post-period and higher wage premiums even in the pre-period. Moreover, they reallocate to 3.8% larger and 1.3% higher predicted productivity establishments compared to the workers that are higher up the wage distribution. Lastly, the paper argues that minimum wage workers move to more stable establishments with a lower churning rate and higher poaching index.

Lastly, we review the effects of the minimum wage increases in the Turkish context. The following articles focus on the minimum wage hike in 2016 as the policy change created an unprecedented increase in the history of minimum wage in Türkiye. Also, they all utilize the EIS data we use. Acar and Bossavie (2019) report that firms that are less productive and smaller in size experience significantly higher exit rates from the formal sector. In other words, the increase may cause the loss of up to 130,000 formal jobs in 2016, whose workers may end up in either unemployment or informal labor. With a similar approach, Bossavie, Erdoğan, and Makovec (2019) document the destruction of formal firms with a higher labor share, less productivity, or lower profit margins. On the worker side, they report a large, positive, and statistically significant effect on the wages of formal workers. However, most workers from the exiting firms fail to be employed formally by the end of 2016. Also, the workers employed in larger firms before the policy change have a higher chance of finding a formal job. Lastly, Akgunduz et al. (2019) argue that a percentage-point increase in labor costs causes a 0.4% decrease in employment.

4. DATA

4.1 Enterprise Information System (EIS)

Our analysis is based on the Enterprise Information System (EIS), which is an integrated database compiled of various administrative records provided by the Ministry of Industry and Technology, Ministry of Trade (MoT), Revenue Administration (GIB), Social Security Institution (SGK), Small and Medium Business Development and Support Administration (KOSGEB), Turkish Statistical Institute (TURKSTAT), Turkish Patent and Trademark Office (TPE), and Scientific and Technological Research Council of Turkey (TUBITAK). The database provides linked employer-employee information on the universe of registered non-financial enterprises and registered workers employed in those enterprises available from 2006.

The EIS database is rich in firm-level information on more than 3 million registered enterprises and individual-level information on 12.6 million workers linked to those enterprises as of 2016 (Acar and Bossavie (2019)). The firm-level records are mainly based on the financial statements and information on firm types, the economic sector at the four-digit level, and the geographical location at the district level. The individual-level information is reported quarterly from the Turkish Social Security Institution. The data include workers' age, gender, days worked, wage, and occupation from 2014 onwards. Moreover, firms and workers can be followed over time as they are identified uniquely within the panel data.

By utilizing EIS, we have comprehensive information on the formal Turkish labor force that allows us to analyze the labor market prospects of both minimum and non-minimum wage workers regarding wage, employment, occupation type, and personal characteristics such as age and gender. Also, the firm-level information linked to the individual-level data provides insights into the composition of firms and their characteristics, such as firm size, productivity, and wage per worker.

One disadvantage of EIS is that it does not provide information about the workers who leave the formal workforce. Considering informal labor is highly prevalent in the Turkish economy, reported as 37.6% of overall employment by TURKSTAT in 2015, different scenarios can be discussed regarding the workers who left formal labor. Still, there is evidence in the literature against transitions into informal employment. Tansel and Acar (2017) report that switching from formal to informal labor is unlikely due to the high degree of segmentation. Still, observing the same behaviour under a survivalist strategy is uncertain after a job loss. Also, Bossavie, Erdoğan, and Makovec (2019) document a negative effect on informal employment after the minimum wage increase in 2016 by supporting EIS data with the Turkish Household Labor Force Survey (HLFS). In light of this evidence, we claim that switching to informal employment after a job loss is not likely but still possible. Nevertheless, we leave out small firms with less than 20 employees to avoid those gaps in the analysis related to the informality.

Considering the lack of mandatory reporting of occupational code changes to the Social Security Institution before 2018, our data might contain another gap. This gap is particularly relevant when employees' job descriptions change within the same company. Such internal shifts might not be reflected in that worker's occupational code, potentially leading to an underestimation of the impact on task intensity scores in our analysis as we might miss workers who changed roles and their task distribution, even though they remain employed in the same firm.

Our analysis focuses on a sample of four years between 2014 and 2017 as we are interested in the shifts within two years after the minimum wage shock compared to the previous two years. As the fundamental elements of our analysis, such as occupational codes within the individual-level data, are provided only after 2014, extending the analysis into larger periods is impossible. Also, we aim to identify the shifts in the patterns of steady workers that do not get in or get out of the labor force very often. Accordingly, we restricted our sample to only the workers present in the pre-treatment period (all quarters of 2014 and 2015 for 8 quarters) in the data to eliminate any temporary or short-term appearance before the increase. Therefore, the workers present in 2014 and 2015 are the ones we only follow in the consecutive years of minimum wage shock. In other words, there is no possible worker entry in the post-treatment period (all quarters of 2016 and 2017 for 8 quarters) in our sample.

In the further steps, we exclude some groups of workers that may divert our analysis from capturing the picture of those steady workers. First, we keep only the full-time workers with a single job as part-time jobs often employ temporary workers such

as students. Secondly, we drop workers younger than 15 years old and those who earned less than 90% of the legal minimum wage of the quarter in any period to avoid noisy data. Lastly, we take out firms with a number of workers lower than 20, as smaller firms are highly dependent on informal labor within the Turkish context.

Our sample consists of 1,734,201 workers who are followed through 16 quarters. Within this sample, 372,762 of them earn minimum wage in the pre-treatment period, whereas 1,361,439 of them earn at least 30% higher than the related minimum wage of that period in the pre-treatment period. Table 4.1 reports the summary statistics for the overall sample, including minimum and non-minimum wage workers. The average age in the sample is close to 36, with women being 80% of the sample. The average monthly gross wage is 3,221.7, and the average probability of job switching is 10%. Task intensity scores' averages are close to 4 points similarly, having a standard deviation between 0.2 and 0.3 points. Comparatively, nonroutine abstract task intensity has the lowest score on average. Regarding average firm characteristics, our sample constitutes workers working in establishments with 1,865.1 workers, with productivity of 744,439.2 TL sales per worker and pay of 2,810.0 TL per worker.

Table 4.1 : Descriptive statistics for all sample

	All Workers						
	Mean	Std	p5	p25	p50	p75	p95
Age	35.9	7.5	25.0	30.0	35.0	41.0	48.0
Women	0.8	0.4	0.0	1.0	1.0	1.0	1.0
Monthly Gross Wage	3,221.7	2,099.0	1,124.5	1,643.3	2,481.2	4,214.7	7,809.9
Job Switch Probability	0.1	0.3	0.0	0.0	0.0	0.0	1.0
Routine Intensity Score	4.0	0.2	3.7	3.9	3.9	4.0	4.3
Nonroutine Manual Intensity Score	3.9	0.2	3.6	3.8	3.9	4.0	4.3
Nonroutine Abstract Intensity Score	3.8	0.3	3.5	3.6	3.8	4.0	4.3
Employment Size	1,865.1	4,347.5	23.5	67.2	297.5	1,381.5	9,570.5
Productivity	744,439.2	4,666,938.6	26,614.7	93,647.9	240,197.7	557,444.5	2,080,303.2
Wage per Worker	2,810.0	1,599.6	1,140.8	1,562.4	2,336.4	3,567.5	6,245.2

Note: The numbers represent the whole sample including minimum wage and non-minimum wage workers.

Table 4.2 shows the same set of summary statistics for a portion of workers who earn minimum wage. On average, the age of minimum wage workers is similar to that of the overall sample, in which women constitute 70%. Compared to the sample average, minimum wage workers earn 63.3% less, 1,181.9 TL. The rest of the statistics are similar to those of the overall sample. Regarding firm characteristics, minimum wage workers work for smaller firms with less productivity and wage per worker on average compared to the sample average.

Table 4.2 : Descriptive statistics for minimum wage workers

	Minimum Wage Workers						
	Mean	Std	p5	p25	p50	p75	p95
Age	36.1	8.8	23.0	29.0	36.0	42.0	51.0
Women	0.7	0.5	0.0	0.0	1.0	1.0	1.0
Monthly Gross Wage	1,181.9	80.5	1,071.0	1,134.0	1,201.5	1,273.5	1,300.0
Job Switch Probability	0.1	0.3	0.0	0.0	0.0	0.0	1.0
Routine Intensity Score	4.0	0.2	3.7	3.9	4.0	4.1	4.3
Nonroutine Manual Intensity Score	4.0	0.2	3.6	3.8	4.0	4.2	4.3
Nonroutine Abstract Intensity Score	3.8	0.3	3.5	3.6	3.7	3.8	4.3
Employment Size	275.8	1,117.9	19.0	28.2	46.2	125.5	1,065.5
Productivity	289,691.3	3413,338.5	19,494.6	48,414.2	113,585.4	258,682.4	887,464.6
Wage per Worker	1,294.2	369.2	973.0	1,155.8	1,219.2	1,319.5	1,873.6

Note: The numbers represent only the minimum wage workers from the sample.

Lastly, Table 4.3 presents the sample of non-minimum wage workers. The average age is 36, and women comprise 80% of non-minimum workers. On average, non-minimum wage workers are paid 17.3% more than the total sample. The job switch probability is 10%, and the task intensity scores have the same average. Regarding firm characteristics, non-minimum wage workers work for larger firms with a higher level of productivity and wage per worker on average compared to the sample average as expected.

Table 4.3 : Descriptive statistics for non-minimum wage workers

	Non-Minimum Wage Workers						
	Mean	Std	p5	p25	p50	p75	p95
Age	35.8	7.0	25.0	31.0	35.0	41.0	48.0
Women	0.8	0.4	0.0	1.0	1.0	1.0	1.0
Monthly Gross Wage	3,780.2	2,039.4	1,659.6	2,150.7	2,998.5	5,000.0	7,809.9
Job Switch Probability	0.1	0.3	0.0	0.0	0.0	0.0	1.0
Routine Intensity Score	3.9	0.2	3.7	3.9	3.9	4.0	4.3
Nonroutine Manual Intensity Score	3.9	0.2	3.6	3.7	3.9	4.0	4.3
Nonroutine Abstract Intensity Score	3.9	0.3	3.5	3.6	3.8	4.1	4.3
Employment Size	2,293.2	4,774.0	30.5	131.8	494.5	1,921.2	11,226.2
Productivity	866,318.6	4,942,153.5	312,22.9	118,583.2	289,147.6	647,907.7	2,342,292.0
Wage per Worker	3,218.3	1,557.4	1,462.3	2,031.3	2,764.3	4,044.8	6,581.7

Note: The numbers represent only the non-minimum wage workers from the sample.

4.2 O*NET Task Scores

In their paper, Autor, Levy, and Murnane (2003) introduced a two-fold approach to identify the task composition of occupations. In their approach, every occupation requires performing a combination of tasks, which they divide into two groups de-

pending on whether they can be performed by a computer: routine and nonroutine tasks.

The former primarily includes repetitive, well-understood procedures that do not require adaptivity depending on the situation and environment and are more prone to substitution by capital when market shocks, such as an increase in labor costs, are in effect. These tasks are closely related to middle and low-wage occupations that partially cover minimum wage workers, such as bookkeepers and office workers.

The latter is divided into two subcategories, which are abstract tasks and manual tasks. Nonroutine abstract tasks primarily require problem-solving, creativity, and adaptivity depending on the situation and environment, which can be complemented by capital. These tasks also need a higher level of education and analytical thinking, which are common traits of higher-wage occupations, such as managerial and technical workers in law and medicine, that are distinct from minimum wage workers. On the other hand, in-person interactions, physical actions, and adaptivity depending on the situation and environment are necessary for nonroutine manual tasks. These tasks are common among occupations that do not require higher education and are highly related to minimum wage workers such as drivers, plumbers, etc. Compared with other tasks, nonroutine manual tasks have limited opportunities to be substituted or complemented by capital.

In line with the task-based conceptual framework of Autor, Levy, and Murnane (2003), Acemoglu and Autor (2011) constructed a scale to define the task composition of occupations. They propose a three-fold score system using the O*NET database, which includes information on work activities associated with occupations. In this system, they assign three different scores that reflect the occupation's task intensities based on routine task intensity, nonroutine abstract task intensity, and nonroutine manual task intensity (See appendix).

In our analysis, we follow Acemoglu and Autor (2011) to identify task intensities associated with the workers' occupations. We define routine task intensity, nonroutine abstract task intensity, and nonroutine manual task intensity scores assigned to every occupation and merge these data with our EIS sample, which is our main source of data. Following this approach, we aim to show the worker-level differences in task intensities between minimum and non-minimum wage workers.

5. SPECIFICATION AND METHODOLOGY

Our aim is to find differences in wage, employment, occupational tasks, and job reallocation between minimum wage workers (treatment group) and non-minimum wage workers (control group). To achieve this, we follow a difference-in-difference strategy.

Our data covers the 16 quarters from the beginning of 2014 to the end of 2017. We identify the quarters of 2014 and 2015 as pre-treatment and the quarters of 2016 and 2017 as post-treatment.

The strategy discussed in the previous section requires workers to appear employed in the data for 8 quarters from 2014 until the end of 2015 (pre-treatment group). Considering this, the following treatment and control groups are formed: 372,762 workers with a wage level between 10% less and more of the legal minimum wage in the pre-treatment period are considered minimum wage workers, which is identified as the treatment group in our study.

On the other hand, three different control groups are generated: Firstly, 105,733 workers with a wage level that is more than 30% and less than 70% of the legal minimum wage for all quarters of the pre-treatment period are considered non-minimum wage workers and identified as the control group (1). Control group (1) is smaller than the other control groups we will identify soon and closer to the treatment group. Therefore, they may experience impacts similar to those of the treatment group due to spillover effects.

Secondly, 1,361,439 workers with a wage greater than 30% of the legal minimum wage for all quarters of the pre-treatment period are considered non-minimum wage workers and identified as the control group (2). Control group (2) covers the workers which shows similar characteristics with the treatment group while including a larger number of workers. We can expect to have somewhat similar but different effects with the treatment group.

Lastly, 960,282 workers with a wage level over 70% higher of the legal minimum wage for all quarters of the pre-treatment period are considered non-minimum wage workers and identified as the control group (3). Control group (3) covers a more distinctive worker group than the other control groups. In other words, it is not expected to see highly impactful spillover effects of the hike.

Throughout the analysis, we will report the effects on our outcome variables using these three different control groups. Additionally, the group of workers who earn less than 30% but higher than 10% of the legal minimum wage for all quarters of the pre-treatment period is excluded. The main reason is to avoid any spillover effects that may be generated on this group, as their wages can move along with the changes in the minimum wage (Bakış and Polat (2013)).

Our outcome variables are as follows: wage level on a continuous scale; employment status, which takes 1 if the worker is employed and 0 otherwise; task intensity scores on a continuous scale and as divided into abstract, nonroutine manual, and routine tasks depending on the reported occupation code; job switch status which takes 1 if the employee of a worker is different from the employee of that worker in the last quarter of 2015 in any period and 0 otherwise; employment size of the firm prior to the minimum wage increase on a continuous scale; productivity (calculated as sales per worker) of the firm prior to the minimum wage increase on a continuous scale; and lastly, wage per worker of the firm prior to the minimum wage increase on a continuous scale. Finally, we have the following equation:

$$Y_{\mathrm{it}} = \beta_0 + \beta_1 \mathrm{Treatment_i} + \beta_2 \mathrm{Post_t} + \beta_3 \mathrm{Treatment_i}{*}\mathrm{Post_t} + \beta_4 \mathrm{Worker_i} + \beta_5 \mathrm{Time_t} + \beta_6 \mathrm{Time_t}{*}\mathrm{Age_i}{*}\mathrm{Gender_i} + \beta_7 \mathrm{Time_t}{*}\mathrm{Sector_i} + \beta_8 \mathrm{Time_t}{*}\mathrm{Province_i}$$

In the above equation, $\mathrm{Y_{it}}$ represents the outcome variable for individual i and time t. The treatment variable takes 1 if worker i is in the treatment group and 0 otherwise. The post variable takes 1 if the period t is after the minimum wage increase and 0 otherwise. The interaction of the treatment and the post variables takes 1 if worker i is in the treatment group in the post-treatment periods in time t and 0 otherwise. Additionally, the model includes worker, time, and time-age-gender fixed effects to avoid any worker and time-specific trends in the specification. Also, time-sector and time-province fixed effects are present in our estimation to absorb any sector and province-level trends depending on time. Standard errors are clustered at the worker level.

In the above model, our interest is in coefficient β_3, which identifies the causal effects of the minimum wage increase on minimum wage workers. The following section will report the results on the variables of interest and show the differences in the

changes between the treatment and control groups in the post-treatment period.

6. RESULTS

6.1 Effect of the Minimum Wage Shock on Wage and Employment Status

We report our difference-in-difference regression results, starting with the minimum wage hike's impact on wage level. Table 6.1 shows that the wage level of the minimum wage workers increases significantly more than the workers earning above the minimum wage for all control groups. In response to a 33% nominal rise in the minimum wage, the minimum wage workers experience a 12.5% higher wage increase than those of the control group (1), significantly at a 1% confidence interval. The same positive relationship is captured in the coefficient with an increasing magnitude for the second and third control groups. Accordingly, the wage increase of the minimum wage workers is 15.6% higher for the second and larger control group and 17.9% higher for the third and more distinct control group, significantly at a 1% confidence interval. As the control group expands and becomes more distinct from the treatment group (as in the case of the third control group), the difference between the treatment and control groups is more visible. In other words, spillover effects that mimic the increase in the minimum wage can be observed in the first control group, which is closer to the treatment group. When control groups (3) and (1) are compared, the diminish in the spillover effect is more visible by creating an additional 5.3 point increase for minimum wage workers compared to the third control group. Considering the relevance of the minimum wage in Türkiye, which was discussed in Chapter 2, the prevalence of the minimum wage policy has proved to be even stronger as wages close to the minimum wage are strictly bonded to the shifts in the minimum wage.

Table 6.1 : Effect of increase in the minimum wage on the monthly gross wage

	Montly Gross Wage		
Control Groups	(1)	(2)	(3)
Treatment*Post	0.125***	0.156***	0.179***
	(0.001)	(0.000)	(0.000)
Constant	7.290***	8.020***	8.102***
	(0.000)	(0.000)	(0.000)
Observations	6,891,380	25,728,881	19,778,470
R-squared	0.910	0.944	0.954

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1
Note: The independent variable represents the logarithm of monthly gross wage. Control group (1) includes workers with a wage level that is more than 30% and less than 70% of the legal minimum wage for all quarters of the pre-treatment period; Control Group (2) includes workers with a wage greater than 30% of the legal minimum wage for all quarters of the pre-treatment period; Control Group (3) includes workers with a wage level over 70% of the legal minimum wage for all quarters of the pre-treatment period.

Secondly, we report our results on the impact of the minimum wage shock on employment status. Table 6.2 shows that the minimum wage workers' employment status is affected negatively in the post-treatment period compared to workers with a wage above the minimum wage, statistically significant for all control groups. After the shock, minimum wage workers lose their employment 4.3% more than those of the first control group, and the effect is 5.4% and 5.9% with the second and third control groups, respectively and significantly at a 1% confidence interval. As in the case of the wage level, the spillover effects are more visible in the closest control group and get smaller as we move towards larger and more distinctive control groups with different job aspects than the minimum wage workers.

Our results are similar to the literature that shows the negative effect of minimum wage on employment (e.g. Stigler (1946)). Even though we fail to reject the negative employment effects, we can not argue that the dropouts are displaced out of the workforce overall. In other words, workers displaced from their formal jobs may be reallocated to informal jobs. Unfortunately, our data limitations do not allow us to observe this possible switch. Another case can be a switch to part-time jobs, as we do not observe them in our data.

Table 6.2 : Effect of increase in the minimum wage on employment status

	Employment Status		
Control Groups	(1)	(2)	(3)
Treatment*Post	-0.043***	-0.054***	-0.059***
	(0.001)	(0.001)	(0.001)
Constant	0.9168***	0.9331***	0.9356***
	(0.0004)	(0.0004)	(0.0001)
Observations	7,655,712	27,747,104	21,328,576
R-squared	0.360	0.336	0.345

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1
Note: The independent variable represents employment status as 1 if the worker is employed and 0 otherwise. Control group (1) includes workers with a wage level that is more than 30% and less than 70% of the legal minimum wage for all quarters of the pre-treatment period; Control Group (2) includes workers with a wage greater than 30% of the legal minimum wage for all quarters of the pre-treatment period; Control Group (3) includes workers with a wage level over 70% of the legal minimum wage for all quarters of the pre-treatment period.

6.2 Effect of the Minimum Wage Shock on Task Intensity Scores

In this part of the results, we report our main findings on the effect of the minimum wage shock on the individual task intensity scores related to the occupational code specified in the data. The change in the occupational code in our data can result from either a switch of position that requires a different set of tasks within the same firm that the worker is employed in or a switch to a new job in a new firm.

As we defined earlier, every job has a routine, nonroutine abstract, and nonroutine manual task score that is related to its features. Accordingly, each task score shows the level of intensity needed for the daily workload. For example, the routine intensity score defines the level of routine tasks that an occupation requires. If an occupation requires a high level of routineness, we expect a higher routine task intensity score than nonroutine manual and nonroutine abstract task intensities. The same rule applies to all other task intensity scores as well.

Table 6.3 : Effect of increase in the minimum wage on the routine intensity score

	Routine Intensity Score		
Control Groups	(1)	(2)	(3)
Treatment*Post	-0.009***	-0.008***	-0.008***
	(0.001)	(0.000)	(0.000)
Constant	-1.0148***	-1.0412***	-1.0428***
	(0.0002)	(0.0000)	(0.0001)
Observations	5,797,472	21,215,762	16,178,774
R-squared	0.539	0.501	0.496

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1
Note: The independent variable represents the logarithm of routine task intensity score. Control group (1) includes workers with a wage level that is more than 30% and less than 70% of the legal minimum wage for all quarters of the pre-treatment period; Control Group (2) includes workers with a wage greater than 30% of the legal minimum wage for all quarters of the pre-treatment period; Control Group (3) includes workers with a wage level over 70% of the legal minimum wage for all quarters of the pre-treatment period.

First, Table 6.3 reports the results of the routine intensity scores. In the post-treatment period, the treatment group works in occupations which are 0.9% less routine task intensified than the first control group, significantly at a 1% confidence interval. The effect loses its power up to 0.8% as we move to the second and third control groups of a larger group of workers. Even though we see a statistically significant decrease in the routine task intensity scores when we compare those who earn minimum wage with all our control groups, the effect is small in magnitude.

Our results show that the minimum wage workers start to work for less routine intense jobs after the change in the minimum wage. This effect may occur in two ways: first, the minimum wage workers switch to different occupations requiring a less routine intensified set of tasks; second, the minimum wage workers who work for highly routine intensified jobs lose their positions. The former explanation points out a shift in the reallocation of workers to nonroutine jobs (e.g. Aaronson and Phelan (2019)). It can be considered as a progressive shift in the economy for the benefit of capital-intensified, good jobs (Acemoglu (2001)). On the other hand, the latter implies a change in the labor force's composition that occurs due to the destruction of formal routine jobs. This movement may lead to job polarization (Autor, Levy, and Murnane (2003)) in a way that the minimum wage workers with high routine intensity jobs may end up as unemployed or informal workers.

Table 6.4 : Effect of increase in the minimum wage on the nonroutine manual intensity score

	Nonroutine Manual Intensity Score		
Control Groups	(1)	(2)	(3)
Treatment*Post	-0.013***	-0.009***	-0.006***
	(0.001)	(0.000)	(0.001)
Constant	-1.0203***	-1.0838***	-1.0904***
	(0.0003)	(0.0000)	(0.0001)
Observations	5,797,472	21,215,762	16,178,774
R-squared	0.585	0.585	0.589

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Note: The independent variable represents the logarithm of nonroutine manual task intensity score. Control group (1) includes workers with a wage level that is more than 30% and less than 70% of the legal minimum wage for all quarters of the pre-treatment period; Control Group (2) includes workers with a wage greater than 30% of the legal minimum wage for all quarters of the pre-treatment period; Control Group (3) includes workers with a wage level over 70% of the legal minimum wage for all quarters of the pre-treatment period.

Secondly, we report the results on the nonroutine manual intensity. As Table 6.4 shows, the nonroutine manual task intensity decreases by 1.3% for a minimum wage worker compared to the first control group worker after the shock, significantly at a 1% confidence interval. The decline is lower in magnitude for the second control group with 0.9% and even lower for the third group with 0.6%. In contrast with the wage and employment characteristics, we see that minimum wage workers show a smaller difference in magnitude against the third control group, which is supposed to be more distinctive compared to the first control group. This decrease in magnitude may stem from the task composition of the jobs in which the third control group works, as they may incur a higher level of nonroutine manual tasks than the first control group.

The effect that is observed on the nonroutine manual intensity scores shows that the minimum wage workers that lose their routine intensified, low-paying jobs fail to switch to nonroutine manual jobs that pay higher wages (Lordan and Neumark (2018); Maarek and Moiteaux (2021)). The explanation follows from the structural similarities of nonroutine manual jobs with routine jobs in the Turkish context. Similar to routine jobs, nonroutine manual jobs are also likely to pay low wages and be very vulnerable to informality. Therefore, those minimum wage workers with nonroutine manual jobs may fall into unemployment or switch to work without registration.

Table 6.5 : Effect of increase in the minimum wage on the nonroutine abstract intensity score

	Nonroutine Abstract Intensity Score		
Control Groups	(1)	(2)	(3)
Treatment*Post	0.011***	0.011***	0.011***
	(0.001)	(0.001)	(0.001)
Constant	-1.2536***	-1.1814***	-1.1721***
	(0.0003)	(0.0001)	(0.0001)
Observations	5,797,472	21,215,762	16,178,774
R-squared	0.580	0.592	0.599

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Note: The independent variable represents the logarithm of nonroutine abstract task intensity score. Control group (1) includes workers with a wage level that is more than 30% and less than 70% of the legal minimum wage for all quarters of the pre-treatment period; Control Group (2) includes workers with a wage greater than 30% of the legal minimum wage for all quarters of the pre-treatment period; Control Group (3) includes workers with a wage level over 70% of the legal minimum wage for all quarters of the pre-treatment period.

Lastly, Table 6.5 reports the results of the nonroutine abstract task intensity scores. The minimum wage workers experience an approximately 1.1% increase in their scores compared to any control groups in the post-treatment period. The effect is statistically significant against all of the control groups.

Our results on nonroutine abstract task intensity align with the previous literature that proposes the rise of abstract jobs by the increasing complementary of the computer adaptation (Autor, Levy, and Murnane (2003)). Still, we doubt whether the results only report a compositional change in the occupations of minimum wage workers or a shift from routine jobs to nonroutine abstract jobs (e.g. Acemoglu (2001)). Another explanation could be changing the set of tasks for which a minimum wage worker is employed. In other words, the job definitions of those who are able to keep their jobs may be modified by the incentives of the employer (to net out the increasing cost of minimum wage worker) or by the incentives of the employee (to increase productivity in response to the increasing probability of lay off).

6.3 Effect of the Minimum Wage Shock on Job Switch and Reallocation of Workers in terms of Firm Characteristics

In the last part of the results, we examine the effect of the minimum wage increase on the job switch and the reallocation of workers. The outcome variable for the job switch implies a change in the firm in which the worker is employed. Other outcome variables for the firm characteristics represent the employment size, productivity, and wage per worker levels of firms that the workers switched to before the increase in the minimum wage in the first quarter of 2016.

Table 6.6 shows the impact on the job switches. Compared to the first control group, minimum wage workers switch to a different firm 2.7% more in the post-treatment period. The effect grows in magnitude for the second and the third control groups, 4.1% for the former and 4.2% for the latter. The results that show the high mobility of the minimum wage workers after the shock can imply changes in the combination of firms or sectors where minimum wage workers can be employed. In other words, if less productive firms with the burden of increasing labor costs exit the market, then those workers who are unemployed have to switch to another firm. Also, the incentives of the minimum wage workers may change with the increasing wage so that they may be willing to work for a more diverse set of firms with less desirable nonwage amenities such as long commuting time (Dustmann et al. (2022)).

Table 6.6 : Effect of increase in the minimum wage on the job switch status

	Job Switch Status		
Control Groups	(1)	(2)	(3)
Treatment*Post	0.027***	0.041***	0.042***
	(0.001)	(0.001)	(0.001)
Constant	0.1258***	0.0967***	0.0874***
	(0.0005)	(0.0001)	(0.0001)
Observations	6,891,380	25,728,881	19,778,470
R-squared	0.483	0.458	0.451

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Note: The independent variable represents job switch status as 1 if the worker is employed and 0 otherwise. Control group (1) includes workers with a wage level that is more than 30% and less than 70% of the legal minimum wage for all quarters of the pre-treatment period; Control Group (2) includes workers with a wage greater than 30% of the legal minimum wage for all quarters of the pre-treatment period; Control Group (3) includes workers with a wage level over 70% of the legal minimum wage for all quarters of the pre-treatment period.

We start the reallocation analysis by showing the change in the employment size for the treatment group after the shock. As seen from Table 6.7, the effect on the employment size is not statistically significant against the first and second control groups. Still, minimum wage workers reallocate to 13.8% larger firms than the third control group, which is significant at 1% confidence level.

Table 6.7 : Effect of increase in the minimum wage on the firm's employment size

	Firm's Employment Size		
Control Groups	(1)	(2)	(3)
Treatment*Post	0.095	0.068	0.138***
	(0.065)	(0.042)	(0.048)
Constant	4.5793***	5.2751***	5.1805***
	(0.0248)	(0.0044)	(0.0074)
Observations	247,778	899,980	616,928
R-squared	0.899	0.896	0.916

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Note: The independent variable represents the logarithm of firm's employment size in the fourth quarter of 2015 which the worker is switched for in the post-treatment period. Control group (1) includes workers with a wage level that is more than 30% and less than 70% of the legal minimum wage for all quarters of the pre-treatment period; Control Group (2) includes workers with a wage greater than 30% of the legal minimum wage for all quarters of the pre-treatment period; Control Group (3) includes workers with a wage level over 70% of the legal minimum wage for all quarters of the pre-treatment period.

We report the productivity result in Table 6.8. Compared to the first control group, which is smaller in size and closest in worker characteristics, minimum wage workers experience a flow towards more productive firms with 11.2%, significantly at a 5% confidence level. The effect is stronger in magnitude, with 18.3% and 18.2% against the second and third control groups and significant at a 1% confidence level.

Table 6.8 : Effect of increase in the minimum wage on the firm's productivity

	Firm's Productivity		
Control Groups	(1)	(2)	(3)
Treatment*Post	0.112**	0.183***	0.182***
	(0.049)	(0.032)	(0.038)
Constant	11.2518***	12.0207***	12.2826***
	(0.0189)	(0.0033)	(0.0059)
Observations	237,877	871,691	595,178
R-squared	0.921	0.935	0.939

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Note: The independent variable represents the logarithm of firm's productivity in the fourth quarter of 2015 which the worker is switched for in the post-treatment period. Control group (1) includes workers with a wage level that is more than 30% and less than 70% of the legal minimum wage for all quarters of the pre-treatment period; Control Group (2) includes workers with a wage greater than 30% of the legal minimum wage for all quarters of the pre-treatment period; Control Group (3) includes workers with a wage level over 70% of the legal minimum wage for all quarters of the pre-treatment period.

Lastly, we discuss the effect on wage per worker (See Table 6.9). The increase in minimum wage has a significant positive effect on the firms that the treatment group is working in terms of wage per worker compared to all control groups. After the policy change, the treatment group reallocates to firms that pay 2.1% higher per worker compared to the first control group, which is significant at a 5% confidence interval. The effect is significantly stronger against the second control group, with 2.8%, and even stronger against the third control group, with 4.5% at a 1% confidence interval.

Table 6.9 : Effect of increase in the minimum wage on the wage per worker

	Firm's Wage per Worker		
Control Groups	(1)	(2)	(3)
Treatment*Post	0.021*	0.028***	0.045***
	(0.011)	(0.008)	(0.009)
Constant	7.2735***	7.7133**	7.7947***
	(0.0043)	(0.0008)	(0.0014)
Observations	247,778	899,978	616,926
R-squared	0.904	0.949	0.961

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1
Note: The independent variable represents the logarithm of firm's wage per worker in the fourth quarter of 2015 which the worker is switched for in the post-treatment period. Control group (1) includes workers with a wage level that is more than 30% and less than 70% of the legal minimum wage for all quarters of the pre-treatment period; Control Group (2) includes workers with a wage greater than 30% of the legal minimum wage for all quarters of the pre-treatment period; Control Group (3) includes workers with a wage level over 70% of the legal minimum wage for all quarters of the pre-treatment period.

Overall, the policy change leads to a reallocation of minimum-wage workers towards better-quality firms. Still, this reallocation may occur due to two other possible explanations that need further research. First, the demise of smaller firms that are low in productivity and high in low-wage labor intensity may cause the reallocation of minimum wage workers from smaller, less productive firms to larger, more productive firms. As a result, those minimum wage workers who are able to find another job can only be employed by the standing firms that are high in productivity, even before the minimum wage increase. Secondly, minimum wage workers that work for less productive firms may fall into unemployment or informal labor after being laid off due to increasing labor costs.

The results touch on the literature from many approaches: similar to Dustmann et al. (2022), minimum wage workers switch to more productive firms that are larger in size and pay higher per worker even before the hike in 2016; it also proves that bargaining mechanisms lead to improvements in the overall productivity of an economy (Agell and Lommerud (1993)).

7. CONCLUSION

Many economists have tried to solve the minimum wage puzzle. In our paper, we estimate the effect of a 33% increase in the minimum wage in 2016 in Türkiye on the labor market prospects of minimum wage workers compared to non-minimum wage workers. Using detailed, employer-employee matched data, we contribute to the minimum wage literature from task intensity composition and worker reallocation perspectives.

We document the following results depending on the control group we compare. We reach a significant and positive difference in wages of minimum wage workers between 12.5-17.9% compared to non-minimum wage workers. On the other hand, minimum wage workers are more likely to be negatively affected, between 4.3-5.9%. Concerning the task intensity scores, we report a significant decrease in the routine task intensity score of the minimum wage workers, around 0.8% more than non-minimum wage workers. The nonroutine task intensity score of the minimum wage workers also decreases more, with a percentage between 0.6-0.13%. While those scores are decreasing, minimum wage workers' nonroutine abstract task intensity score increases by 1.1% more than non-minimum wage workers. Lastly, the probability of switching to another firm is 2.7-4.2% higher for minimum wage workers. Moreover, the minimum wage workers reallocate to "better" firms. The firms where the minimum wage workers switched are 13.8% larger in employment size, which is significant only compared to the control group (3). Also, minimum wage workers move to firms that are more productive by a percentage between 11.2-18.2%. Lastly, they start working for firms that pay 2.1-4.5% more.

Before finishing, we must readdress the possible scenarios behind the changes in task intensity scores and firm characteristics. The former may arise from the possibility that the changes in the task intensity scores may not reflect the increasing number of minimum wage workers working in nonroutine abstract intensified jobs and less routine and nonroutine manual intensified jobs, but a compositional change due to minimum wage workers who work in routine and nonroutine manual intensified

jobs losing their positions or switching informality. The latter may be based on the ambiguity of whether minimum wage workers are reallocated to "good" firms or have to switch to those firms due to the exits of "bad" firms. More comprehensive research on those questions with a perspective on the composition of workers, job creation, and firm exits can be the next step.

8. APPENDIX

O*NET task measures used for our analysis are composed of the measures of O*NET Work Activities and Work Context Importance scales reported in relation to the occupational SOC code. We followed the multi-item, additive scales of Acemoglu and Autor (2011) from the O*Net database to identify occupation-level task measures. The identification was carried out by matching the occupational SOC codes with the related ISCO codes to match the EIS data. Any ISCO code related to more than one SOC code is used by taking the average of all related occupations. The O*Net items used in each are listed below under the names of "Nonroutine Abstract", "Routine", and "Nonroutine Manual".

Routine:

Routine cognitive

- 4.C.3.b.7 Importance of repeating the same tasks
- 4.C.3.b.4 Importance of being exact or accurate
- 4.C.3.b.8 Structured v. Unstructured work (reverse)

Routine manual

- 4.C.3.d.3 Pace determined by speed of equipment
- 4.A.3.a.3 Controlling machines and processes
- 4.C.2.d.1.i Spend time making repetitive motions

Nonroutine manual:

Non-routine manual physical

- 4.A.3.a.4 Operating vehicles, mechanized devices, or equipment

- 4.C.2.d.1.g Spend time using hands to handle, control or feel objects, tools or controls
- 1.A.2.a.2 Manual dexterity
- 1.A.1.f.1 Spatial orientation

Nonroutine Abstract:

Non-routine cognitive: Analytical

- 4.A.2.a.4 Analyzing data/information
- 4.A.2.b.2 Thinking creatively
- 4.A.4.a.1 Interpreting information for others

Non-routine cognitive: Interpersonal

- 4.A.4.a.4 Establishing and maintaining personal relationships
- 4.A.4.b.4 Guiding, directing and motivating subordinates
- 4.A.4.b.5 Coaching/developing others

BIBLIOGRAPHY

Aaronson, Daniel, and Brian J Phelan. 2019. "Wage shocks and the technological substitution of low-wage jobs." *The Economic Journal* 129(617): 1–34.

Acar, Aysenur, and Laurent Bossavie. 2019. "Do firms exit the formal economy after a minimum wage hike?" *World Bank Policy Research Working Paper* (8749).

Acemoglu, Daron. 2001. "Good jobs versus bad jobs." *Journal of labor Economics* 19(1): 1–21.

Acemoglu, Daron, and David Autor. 2011. "Skills, tasks and technologies: Implications for employment and earnings." In *Handbook of labor economics*. Vol. 4 Elsevier pp. 1043–1171.

Agell, Jonas, and Kjell Erik Lommerud. 1993. "Egalitarianism and growth." *The Scandinavian journal of economics* pp. 559–579.

Akgunduz, Yusuf Emre, Altan Aldan, Yusuf Kenan Bagir, and Huzeyfe Torun. 2019. Impact of minimum wages on exporters: Evidence from a sharp minimum wage increase in Turkey. Technical report.

Autor, David H, Frank Levy, and Richard J Murnane. 2003. "The skill content of recent technological change: An empirical exploration." *The Quarterly journal of economics* 118(4): 1279–1333.

Bakış, Ozan, and Sezgin Polat. 2013. "Wage inequality in Turkey: 2002-2010." *İstanbul: TÜSİAD* .

Bossavie, Laurent, Ayşenur Acar Erdoğan, and Mattia Makovec. 2019. "The impact of the minimum wage on firm destruction, employment and informality." *World Bank* .

Bossler, Mario, and Hans-Dieter Gerner. 2020. "Employment effects of the new German minimum wage: Evidence from establishment-level microdata." *ILR review* 73(5): 1070–1094.

Bossler, Mario, and Thorsten Schank. 2023. "Wage inequality in Germany after the minimum wage introduction." *Journal of Labor Economics* 41(3): 813–857.

Brochu, Pierre, and David A Green. 2013. "The impact of minimum wages on labour market transitions." *The Economic Journal* 123(573): 1203–1235.

Card, David. 1992*a*. "Do minimum wages reduce employment? A case study of California, 1987–89." *ILR Review* 46(1): 38–54.

Card, David. 1992*b*. "Using regional variation in wages to measure the effects of the federal minimum wage." *Ilr Review* 46(1): 22–37.

Card, David, and Alan B Krueger. 1993. "Minimum wages and employment: A case study of the fast food industry in New Jersey and Pennsylvania.".

Cengiz, Doruk, Arindrajit Dube, Attila Lindner, and David Zentler-Munro. 2022. "Seeing beyond the trees: Using machine learning to estimate the impact of minimum wages on labor market outcomes." *Journal of Labor Economics* 40(S1): S203–S247.

Clemens, Jeffrey, and Michael Wither. 2019. "The minimum wage and the Great Recession: Evidence of effects on the employment and income trajectories of low-skilled workers." *Journal of Public Economics* 170: 53–67.

Currie, Janet, and Bruce Fallick. 1993. *A Note on the New Minimum Wage Research*. National Bureau of Economic Research Cambridge, MA.

Draca, Mirko, Stephen Machin, and John Van Reenen. 2011. "Minimum wages and firm profitability." *American economic journal: applied economics* 3(1): 129–151.

Drechsel-Grau, Moritz. 2022. "Macroeconomic and distributional effects of higher minimum wages.".

Dube, Arindrajit, T William Lester, and Michael Reich. 2016. "Minimum wage shocks, employment flows, and labor market frictions." *Journal of Labor Economics* 34(3): 663–704.

Dustmann, Christian, Attila Lindner, Uta Schönberg, Matthias Umkehrer, and Philipp Vom Berge. 2022. "Reallocation effects of the minimum wage." *The Quarterly Journal of Economics* 137(1): 267–328.

Edin, Per-Anders, and Robert Topel. 1997. "Wage policy and restructuring: The Swedish labor market since 1960." In *The welfare state in transition: Reforming the Swedish model*. University of Chicago Press pp. 155–202.

Gürcihan Yüncüler, Burcu, and Çağlar Yüncüler. 2016. Minimum Wage Effects on Labor Market Outcomes in Turkey. Technical report Research and Monetary Policy Department, Central Bank of the Republic of Turkey.

Harasztosi, Péter, and Attila Lindner. 2019. "Who pays for the minimum wage?" *American Economic Review* 109(8): 2693–2727.

Hazans, Mihails. 2011. "Informal workers across Europe: Evidence from 30 countries.".

Katz, Lawrence F, and Alan B Krueger. 1992. "The effect of the minimum wage on the fast-food industry." *ILR Review* 46(1): 6–21.

Lester, Richard A. 1960. "Employment effects of minimum wages." *ILR Review* 13(2): 254–264.

Linneman, Peter. 1982. "The economic impacts of minimum wage laws: a new look at an old question." *Journal of Political Economy* 90(3): 443–469.

Lordan, Grace. 2019. "People versus machines in the UK: Minimum wages, labor reallocation and automatable jobs." *Plos one* 14(12): e0224789.

Lordan, Grace, and David Neumark. 2018. "People versus machines: The impact of minimum wages on automatable jobs." *Labour Economics* 52: 40–53.

Maarek, Paul, and Elliot Moiteaux. 2021. "Polarization, employment and the minimum wage: Evidence from European local labor markets." *Labour Economics* 73: 102076.

Neumark, David, and William Wascher. 1992. "Employment effects of minimum and subminimum wages: panel data on state minimum wage laws." *ILR Review* 46(1): 55–81.

Neumark, David, William L Wascher et al. 2007. "Minimum wages and employment." *Foundations and Trends® in Microeconomics* 3(1–2): 1–182.

Portugal, Pedro, and Ana Rute Cardoso. 2006. "Disentangling the minimum wage puzzle: an analysis of worker accessions and separations." *Journal of the European Economic Association* 4(5): 988–1013.

Sefil-Tansever, Sinem, and Ensar Yılmaz. 2024. "Minimum wage and spillover effects in a minimum wage society." *Labour* 38(1): 150–176.

Stigler, George J. 1946. "The economics of minimum wage legislation." *The American Economic Review* 36(3): 358–365.

Tansel, Aysit, and Elif Öznur Acar. 2017. "Labor mobility across the formal/informal divide in Turkey: Evidence from individual-level data." *Journal of Economic Studies* 44(4): 617–635.